

IN THE CLAIMS

1. (Currently Amended) A method for operating a radio frequency RF apparatus for communications equipment, comprising:

under the control of a data processor of the communications equipment,

generating a calibration signal;

injecting the calibration signal into an amplifier of the RF apparatus;

measuring a downconverted response of the RF apparatus at a plurality of different internal states of the RF apparatus using at least one frequency of the calibration signal; and

~~at least one of~~ tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to compensate at least for variations in component values that comprise the at least one resonator, ~~or adjusting linearity of the RF apparatus.~~

2. (Previously Presented) A method as in claim 1, where the calibration signal is generated using a frequency synthesizer of the communications equipment.

3. (Previously Presented) A method as in claim 1, where the calibration signal is generated using an oscillator that comprises said at least one resonator.

4. (Canceled)

5. (Previously Presented) A method as in claim 1, where the step of tuning a resonance frequency of the at least one resonator comprises also fine tuning the resonance to compensate for variations in power supply current using one of predetermined information or executing the calibration procedure at different power supply current levels.

6. (Canceled)

7. (Previously Presented) A method as in claim 1, where an output of the amplifier is coupled to an input of a downconversion mixer, and where the step of measuring observes an output of a received signal strength indicator RSSI that is located downstream from the downconversion mixer.

8. (Previously Presented) A method as in claim 1, where the RF apparatus is a direct conversion receiver, where an output of the amplifier is coupled to an input of a downconversion mixer, and where the calibration signal is modulated so as to avoid the generation of a DC or a passband signal at the output of the downconversion mixer during normal downconversion operation.

9. (Original) A method as in claim 1, where generating the calibration signal comprises attenuating the calibration signal.

10. (Previously Presented) A method as in claim 1, where injecting the calibration signal includes disabling a normal received signal input to the amplifier.

11. (Original) A method as in claim 1, where the communications equipment comprises a mobile station that operates in accordance with a TDMA protocol.

12. (Original) A method as in claim 1, where the communications equipment comprises a mobile station that operates in accordance with a CDMA protocol.

13. (Previously Presented) A method as in claim 1, where the RF apparatus comprises a direct conversion receiver, and where the communications equipment comprises a mobile station that operates in accordance with a CDMA protocol.

14. (Original) A method as in claim 1, where the communications equipment comprises a base station that operates in accordance with one of a TDMA protocol or a CDMA protocol.

15. (Original) A method as in claim 1, and further comprising changing the resonance frequency after calibrating, and during normal operation, based on a current local oscillator frequency.

16. (Currently Amended) A radio frequency RF apparatus of a communications equipment, comprising calibration circuitry that operates under control of a data processor of said communications equipment for calibrating RF circuitry of said communications equipment, said calibration circuitry comprising a source of a RF calibration signal and circuitry for coupling said RF calibration signal to an amplifier of said RF apparatus; said calibration circuitry further comprising circuitry for measuring a downconverted response of said RF apparatus at a plurality of different internal states of said RF apparatus using at least one frequency of the RF calibration signal and for performing ~~at least one of~~ tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to

compensate at least for variations in component values that comprise said at least one resonator, ~~or adjusting linearity of said RF apparatus.~~

17. (Previously Presented) A RF apparatus as in claim 16, where said calibration signal source comprises a frequency synthesizer of said communications equipment.

18. (Previously Presented) A RF apparatus as in claim 16, where said calibration signal source comprises an oscillator that in turn comprises said at least one resonator.

19. (Canceled)

20. (Previously Presented) A RF apparatus as in claim 16, where said circuitry for tuning said resonance frequency also fine tunes said resonance to compensate for variations in power supply current using one of predetermined information or executing the calibration procedure at different power supply current levels.

21. (Previously Presented) A RF apparatus as in claim 16, and further comprising a modulator for modulating said calibration signal, and where said circuitry for adjusting said linearity of said RF apparatus comprises making an adjustment for either a second order input intercept point IIP2 or a third order input intercept point IIP3.

22. (Previously Presented) A RF apparatus as in claim 16, where an output of said amplifier is coupled to an input of a downconversion mixer, and where said measuring circuitry observes an output of a received signal strength indicator RSSI that is located downstream from said downconversion mixer.

23. (Previously Presented) A RF apparatus as in claim 16, where said RF apparatus is a direct conversion receiver, where an output of said amplifier is coupled to an input of a downconversion mixer, and where said calibration signal is modulated to avoid generating a DC signal or a passband at an output of said downconversion mixer during normal downconversion operation.

24. (Previously Presented) A RF apparatus as in claim 16, where said source comprises an attenuator for attenuating an output of a frequency synthesizer to provide said calibration signal.

25. (Previously Presented) A RF apparatus as in claim 16, where when said calibration signal is coupled to said amplifier a normal received signal input to said amplifier is disabled.

26. (Previously Presented) A RF apparatus as in claim 16, where said communications equipment comprises a mobile station that operates in accordance with a TDMA protocol.

27. (Previously Presented) A RF apparatus as in claim 16, where said communications equipment comprises a mobile station that operates in accordance with a CDMA protocol.

28. (Previously Presented) A RF apparatus as in claim 16, where said RF apparatus comprises a direct conversion receiver, and where said communications equipment comprises a mobile station that operates in accordance with a CDMA protocol.

29. (Previously Presented) A RF apparatus as in claim 16, where said communications equipment comprises a base station that operates in accordance with one of a TDMA protocol or a CDMA protocol.

30. (Previously Presented) A RF apparatus as in claim 16, where said communications equipment changes the resonance frequency after calibrating, and during normal operation, based on a current local oscillator frequency.

31.-32. (Canceled)

33. (Currently Amended) A method for operating a radio frequency RF apparatus of a communications equipment, comprising:

under the control of a data processor of the communications equipment,

generating a fixed calibration signal;

injecting the fixed calibration signal into an amplifier of the RF apparatus;

tuning the amplifier to a plurality of different tuning points and measuring a corresponding downconverted response of the RF apparatus; and

~~at least one of~~ tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to compensate at least for variations in component values that comprise the at least one resonator, ~~or adjusting the linearity of the RF apparatus.~~

34. (Original) A method as in claim 33, where the calibration signal is generated using a frequency synthesizer of the communications equipment.

35. (Previously Presented) A method as in claim 33, where the calibration signal is generated using an oscillator that comprises said at least one resonator.

36. (Canceled)

37. (Currently Amended) A method as in claim 33, and further comprising changing the resonance frequency after calibrating, and during normal operation, based on a current local oscillator frequency.

38. (Canceled)

39. (Previously Presented) A method for operating a mobile station comprising, during a time that an RF apparatus is required, operating a data processor of said mobile station for enabling an amplifier in said RF apparatus, generating a calibration signal within said mobile station, coupling said calibration signal into said RF apparatus, measuring a downconverted response of the RF apparatus to said calibration signal, and at least one of tuning a resonance frequency of at least one resonator based on the measured downconverted response, or adjusting the linearity of a receiver chain in said RF apparatus.

40. (Original) A method as in claim 39, where the downconverted calibration signal is located outside of a receiver passband transfer function so that the calibration signal is not totally rejected.

41. (Original) A method as in claim 39, where the downconverted calibration signal is separated from the received signal spectrum by bandpass filtering in the digital domain.

42. (Currently Amended) A radio frequency RF apparatus of a communications equipment, comprising calibration means that operates under control of a data processor of said communications equipment for calibrating RF circuitry of said communications equipment, said calibration means comprising a means for sourcing a RF calibration signal and means for coupling said RF calibration signal to an amplifier of said RF apparatus; said calibration circuitry further comprising means for measuring a downconverted response of said RF apparatus at a plurality of different internal states of said RF apparatus using at least one frequency of the RF calibration signal and means for ~~performing at least one of~~ tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to compensate at least for variations in component values that comprise said at least one resonator, ~~or adjusting linearity of said RF apparatus.~~

43. (Previously Presented) The RF apparatus of claim 42, wherein the means for measuring a downconverted response further comprises means for tuning the amplifier to a plurality of different tuning points and means for measuring a corresponding downconverted response of the RF apparatus.

44. (Currently Amended) A communications equipment comprising:

a memory comprising a program comprising machine-readable instructions;

and

a data processor coupled to the memory and coupleable to a radio frequency RF apparatus comprising a source configured to generate a calibration signal, circuitry configurable to coupled the calibration signal to an amplifier, the amplifier, and at least one



resonator, the data processor configured to execute the program, the program comprising operations of:

configuring the source to generate a calibration signal;

configuring the circuitry to inject the calibration signal into the amplifier of the RF apparatus;

measuring a downconverted response of the RF apparatus at a plurality of different internal states of the RF apparatus using at least one frequency of the calibration signal; and

~~at least one of~~ tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to compensate at least for variations in component values that comprise the at least one resonator, ~~or adjusting linearity of the RF apparatus.~~

45. (Previously Presented) The communications equipment of claim 44, wherein the operation of measuring a downconverted response further comprises tuning the amplifier to a plurality of different tuning points and measuring a corresponding downconverted response of the RF apparatus.

46. (New) A method as in claim 1, further comprising adjusting, based on the measured downconverted response, linearity of the RF apparatus.

47. (New) A RF apparatus as in claim 16, wherein the circuitry for performing tuning further comprises circuitry for adjusting linearity of said RF apparatus based on the measured downconverted response.

48. (New) A method as in claim 33, further comprising adjusting, based on the measured downconverted response, linearity of said RF apparatus.

49. (New) A RF apparatus as in claim 42, wherein the means for tuning further comprises means for adjusting linearity of said RF apparatus based on the measured downconverted response.

50. (New) A communications equipment as in claim 44, wherein the program further comprises an operation of adjusting, based on the measured downconverted response, linearity of the RF apparatus.

51. (New) A method for operating a radio frequency RF apparatus for communications equipment, comprising:

under the control of a data processor of the communications equipment,

generating a calibration signal;

injecting the calibration signal into an amplifier of the RF apparatus;

measuring a downconverted response of the RF apparatus at a plurality of different internal states of the RF apparatus using at least one frequency of the calibration signal; and

at least one of tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to compensate at least for variations in component values that comprise the at least one resonator, or adjusting linearity of the RF apparatus, where the resonance frequency is tuned based on a strongest measured downconverted response, and where the linearity is adjusted based on a weakest downconverted response.

52. (New) A method as in claim 51, where generating the calibration signal comprises generating a modulated calibration signal, and where adjusting the linearity of the RF apparatus comprises making an adjustment for either the second order input intercept point IIP2 or the third order input intercept point IIP3.

53. (New) A radio frequency RF apparatus of a communications equipment, comprising calibration circuitry that operates under control of a data processor of said communications equipment for calibrating RF circuitry of said communications equipment, said calibration circuitry comprising a source of a RF calibration signal and circuitry for coupling said RF calibration signal to an amplifier of said RF apparatus; said calibration circuitry further comprising circuitry for measuring a downconverted response of said RF apparatus at a plurality of different internal states of said RF apparatus using at least one frequency of the RF calibration signal and for performing at least one of tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to compensate at least for variations in component values that comprise said at least one resonator, or adjusting linearity of said RF apparatus, where said resonance frequency is capable of being tuned based on a strongest measured downconverted response, and where said linearity is capable of being adjusted based on a weakest downconverted response.

54. (New) A RF apparatus as in claim 54, and further comprising a modulator for modulating said calibration signal, and where said circuitry for adjusting said linearity of said RF apparatus comprises making an adjustment for either a second order input intercept point IIP2 or a third order input intercept point IIP3.

55. (New) A method for operating a radio frequency RF apparatus of a communications equipment, comprising:

under the control of a data processor of the communications equipment,

generating a fixed calibration signal;

injecting the fixed calibration signal into an amplifier of the RF apparatus;

tuning the amplifier to a plurality of different tuning points and measuring a corresponding downconverted response of the RF apparatus; and

at least one of tuning a resonance frequency of at least one resonator based on the measured downconverted response so as to compensate at least for variations in component values that comprise the at least one resonator, or adjusting the linearity of the RF apparatus, where the resonance frequency is tuned based on a strongest measured downconverted response, and where the linearity is adjusted based on a weakest downconverted response.